

Second Five-Year Review Report

for

**Palmetto Wood Preserving Site
Dixiana, Lexington County, South Carolina**

PREPARED BY:

**United States Army Corps of Engineers, Charleston District
Charleston, South Carolina**

FOR:

**United States Environmental Protection Agency
Atlanta, Georgia**

June 2002

Table of Contents

List of Acronyms
Executive Summary
Five-Year Review Summary Form

I.	Introduction.....	1
II.	Site Chronology.....	2
III.	Background.....	2
IV.	Remedial Actions.....	4
	A. Remedy Selection.....	4
	B. Remedy Implementation.....	6
	C. System Operations.....	7
V.	Five-year Review Process.....	8
VI.	Five Year Review Findings.....	9
	A. Interviews.....	9
	B. Site Visit/Inspection.....	10
VII.	Assessment	
	A. Data Review.....	10
	B. Trend Analysis.....	11
	C. Applicable or Relevant and Appropriate Requirements (ARARs) Review.....	11
VIII.	Issues.....	13
IX.	Recommendations and Follow-up Actions.....	13
X.	Protectiveness Statements.....	14
XI.	Next Review.....	14

Table of Contents

List of Acronyms
Executive Summary
Five-Year Review Summary Form

I.	Introduction.....	1
II.	Site Chronology.....	2
III.	Background.....	2
IV.	Remedial Actions.....	4
	A. Remedy Selection.....	4
	B. Remedy Implementation.....	6
	C. System Operations.....	7
V.	Five-year Review Process.....	8
VI.	Five Year Review Findings.....	9
	A. Interviews.....	9
	B. Site Visit/Inspection.....	10
VII.	Assessment	
	A. Data Review.....	10
	B. Trend Analysis.....	11
	C. Applicable or Relevant and Appropriate Requirements (ARARs) Review.....	11
VIII.	Issues.....	13
IX.	Recommendations and Follow-up Actions.....	13
X.	Protectiveness Statements.....	14
XI.	Next Review.....	14

Tables

Table 1. Chronology of Site Events.....	2
Table 2. Annual O&M Costs.....	8

Attachments

Attachment A. Documents Reviewed.....	16
Attachment B. Site Maps.....	17
Figure 1 – Site Area Map.....	18
Figure 2 – Site Features Map.....	19
Figure 3 – Original Plume Boundary Definition.....	20
Figure 4 – Estimated Current Plume Boundary.....	21
Attachment C. Photographs.....	22
Attachment D. List of Attendees.....	23
Attachment E. Graphic: Sampling Data.....	24
Table 1 – Groundwater Sampling Summary – April 2002.....	25
Table 2 – Groundwater Sampling Field Parameters – April 2002.....	26
Figure 1 – Chromium Concentration Trends in Groundwater Part 1.....	27
Figure 2 – Chromium Concentration Trends in Groundwater Part 2	28
Figure 3 – Chromium Concentration Trends in Groundwater Part 3.....	29

List of Acronyms

ACC	acid-copper-chromate
ARARs	Applicable or Relevant and Appropriate Requirements
CCA	chromate-copper-arsenate
CDM	Camp, Dresser, and McKee Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FCAP	fluoride-chromate-arsenate-phenol
GETS	Groundwater Extraction and Treatment System
GPM	Gallons Per Minute
HASP	Health and Safety Plan
IT	International Technologies
MCLs	Maximum Contaminant Levels
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OHM	OHM Remediation Services Corp.
OSHA	Occupational Safety and Health Administration
RD	Remedial Design
SCDHEC	South Carolina Department of Health and Environmental Control
O&M	Operation and Maintenance
OUs	Operable Units
PA/SI	Preliminary Assessment/Site Investigation
POTW	Publicly Owned Treatment Works
PRP	Potential Responsible Party
PWPS	Palmetto Wood Preserving Site
RA	Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
DWA	Safe Drinking Water Act
USACE	U.S. Army Corps of Engineers
WTS	Water Treatment System

Executive Summary

The first five-year review of the Palmetto Wood Preserving Site (PWPS) in Dixiana, Lexington County, South Carolina was completed by the U.S. Environmental Protection Agency on June 26, 1997. The second five-year review of the PWPS was completed by the U.S. Army Corps of Engineers (USACE) in June 2002. The results of these five-year reviews indicate that the remedy is expected to be protective of human health and the environment. Overall, the groundwater treatment system and landfill cap remedial actions are functioning as designed, and for the most part are operated and maintained in an appropriate manner.

The protection of human health and the environment by the remedial actions at operable unit (OU)-1 and OU-2 are discussed below. Both the Health and Safety Plan and the Contingency Plan are in place, sufficient to control risks, and properly implemented. Therefore, the remedial actions at both OU-1 and OU-2 are protective of human health and the environment.

Operable Unit 1 - Soil

The remedy at OU-1 is protective of human health and the environment. EPA began the remediation for the soil on September 30, 1988. EPA excavated, treated, solidified and replaced 12,686 cubic yards of soil, eliminating the potential for off-site contaminant migration. EPA completed this portion of the cleanup on February 8, 1989. The remedy at OU-1 is considered a permanent remedy, and no further action is required.

Operable Unit 2 – Groundwater

The remedy at OU-2 is protective of human health and the environment. The groundwater extraction and treatment system is operating and functioning as designed. Levels of contaminants are falling as needed to achieve cleanup levels within the time frame anticipated at the time of the Record of Decision (ROD), and all contaminated groundwater upgradient of the wetland area is being captured to limit further migration.

Five-Year Review Summary Form

Site Name: Palmetto Wood Preserving		EPA ID: SCD003362217
Region: 04	State: South Carolina	City/County: Lexington County
LTRA* (highlight) Y	Construction Completion Date: 9/30/97	
Fund/PRP Lead: Fund	NPL Status: Final 09/83	
Lead Agency: EPA Region 4		
Who conducted the review (EPA Region, state, Federal agencies or contractor): US Army Corps of Engineers, Charleston District		
Dates review conducted: From 3/02 To: 6/02		Dates of site visit: 6/4/02
Whether first or successive review: Second Review		
Circle: Statutory Policy		Due Date: July 2002
Trigger for this review(name and date): Previous Five Year Review 6/26/97		
Recycling, reuse, redevelopment site (highlight):		Y N

Issues:

Except for the filing of bankruptcy by International Technologies (IT) in April 2002, which did not affect the on-going remedial activities, no major issues or deficiencies were noted.

Recommendations:

In accordance with the ROD for the PWPS, groundwater remediation should continue until all COCs in the aquifer fall below the Safe Drinking Water Act standards i.e., until the cleanup goal for chromium (the only remaining contaminant) falls below 100 ug/l.

Protectiveness Statement(s):

All elements of the remedy selected in the ROD for the PWPS have been put in place, are functioning properly, and remain protective of human health and the environment.

Other Comments:

None

Approved by:



Richard D. Green, Director
Waste Management Division
U.S. EPA Region 4

18 SEP 02

Date

Palmetto Wood Preserving Site Lexington County, South Carolina Second Five-Year Review Report

I. Introduction and Purpose

General. During March through June 2002, the U.S. Army Corps of Engineers, Charleston District (USACE), on behalf of the U.S. Environmental Protection Agency, Region 4 (EPA), conducted a Five-Year Review of the remedy implemented at the Palmetto Wood Preserving Site (PWPS) in Lexington County, South Carolina. This report documents the results of that review. The purpose of Five-Year Reviews is to determine whether the remedial actions at a site remain protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, any issues identified during the review will be presented, along with recommendations to address them.

Authority. This review is required by statute. Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Section 300.430 (f) (4) (ii) of the National Oil and Hazardous Substance Contingency Plan (NCP), require that periodic reviews be conducted at least every five years for sites where hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of all remedial actions.

This is the second Five-Year Review for the Palmetto Wood Preserving Site. The trigger for this statutory review is the passage of five years since the first review and includes completion of construction and the start of the Operation and Maintenance (O&M) of the OU-2, groundwater extraction, treatment and discharge systems. All elements of the remedy for the site have been completed; the only on-going actions at the site are operations and maintenance activities intended to maintain the integrity of the remedy, and long-term monitoring to evaluate the effectiveness of the remedy.

Local Repository. This review will be placed in the site files and local repository for the Palmetto Wood Preserving. The repository is located at R. H. Smith Library, 1006 12th Street, Cayce, South Carolina 29033.

Note. Throughout this report, text has been extracted, summarized and/or edited from the following Palmetto Wood Preserving Site documents; EPA Record of Decision (ROD) dated September 30, 1987 and the Explanation of Significant Differences (ESD); Preliminary Remedial Action (RA) Report; Interim Operation and Maintenance Report; O&M manuals and semi-annual groundwater monitoring data (**Attachment A**).

II. Site Chronology

Table 1 lists the chronology of events for the PWPS.

<u>Event</u>	<u>Date</u>
PWP began operations	1963
SCDHEC received complaints	1981/1982
SCDHEC issued consent order to PWP	May 1983
PWP formally listed on NPL	September 1983
Preliminary Assessment/Site Investigation (PA/SI)	November 1983
PWP ceased operations	1985
Remedial Investigation (RI)	July 1986
Feasibility Study (FS)	1987
Record of Decision (ROD)	September 1987
Explanation of Significant Differences (ESD)	September 1993
Remedial Design (RD) began	August 1995
Complete remedial design and began mobilization	February 1996
Remedy construction completed	May 1997

III. Background

Site Location. The PWPS is located in the rural community of Dixiana in Lexington County, South Carolina (**Attachment B, Figure 1**) and is approximately 0.5 miles northeast of I-26 and 1.34 miles southeast of Interchange 115 on Route 129/Dixiana Road. The area is approximately 1.5 miles southeast of West Columbia, and 6.4 miles southwest of Columbia, South Carolina. The Dixiana area lies in South Carolina's Upper Coastal Plain Physiographic Province. The area is characterized by generally flat to slightly rolling land with low wet areas and slow-moving streams.

Site Description. The site consists of approximately 5 acres of land, of which 3.67 acres is owned by George K. Bellinger of South Carolina (**Attachment B, Figure 2**). The remaining parcel of land is owned by South Carolina Electric and Gas. The PWPS is a decommissioned wood preserving facility which operated between 1963 and 1985. PWP began operating in 1963, using a fluoride-chromate-arsenate-phenol (FCAP) and an acid-copper-chromate (ACC) process. In 1980, Eastern Forest Products took over and switched to a chromate-copper arsenate (CCA) process. During the treatment process, wood was loaded onto a small, narrow gauge railcar and moved into a pressure vessel where the material was pressure impregnated with the solution. The wood was then removed and allowed to dry, either in a drip shed or in the storage yard areas.

During the period of operation, the Site consisted of the plant structure and equipment (the pressure vessel, narrow gauge rail line, solution storage tanks, drip shed, storage and office building). When the company ceased operations in 1985, all equipment (including pressure cells, piping, narrow gauge rail line and above ground storage tanks) was removed from the Site to an unknown location.

Site History. In 1981 and 1982, SCDHEC received complaints from residents and adjacent property owners that green liquids were running off-site and pooling nearby. As a result of these complaints, SCDHEC inspected the Site and collected soil and private well water samples. Although the water samples showed no evidence of contamination, soil samples indicated high levels of chromium were present.

Subsequent complaints and investigations led SCDHEC to issue a Notice of Violation to the company in March 1983. Discussions between plant personnel and SCDHEC produced plans for improvements to minimize future problems. These plans, however, were never implemented.

In April 1983, a new residential drinking well was drilled 200 feet from the Site. Initial pumping yielded bright yellow water containing high levels of copper and chromium. PWP subsequently supplied potable water to this residence from a well on-site. SCDHEC personnel sampled nearby private wells in May 1983, but did not find contamination in any other well. SCDHEC issued PWP a Consent Order compelling PWP to assess the Site contamination.

EPA conducted a Preliminary Assessment (PA) of the Site in November 1983. The PA indicated soil and water contamination beneath the main process area of the plant. Subsequently, EPA added the PWPS to the NPL and assumed responsibility for the Site.

EPA completed an RI in July 1986, characterizing the contamination at the Site and providing data to analyze the alternatives for remediation of the Site. The results of the RI indicated the presence and extent of contamination in surface water, sediments, soil and groundwater on the Site and in the surrounding areas. The RI showed that the contamination was caused by the solution that PWP used to pressure treat lumber. The solution had dripped onto the soil and percolated into the ground, reaching the water table.

The RI showed the highest levels of soil contamination at the surface. Soil contamination decreased in nearly linear fashion to background levels within the first 12 feet. EPA field investigations detected metal concentrations well above background levels to depths as great as 17 feet in numerous locations. The highest concentrations of metals (arsenic and chromium) in the subsurface soils were associated with the narrow gauge rail line and drip shed areas towards the east of the Site, and along the railroad tracks.

The RI also showed that the groundwater beneath the Site was severely contaminated. Groundwater samples taken from 12 monitoring wells and 21 temporary wells revealed levels of copper, chromium, and arsenic that exceeded applicable standards. The contaminant with the highest concentration in the groundwater was chromium. Higher concentrations of metals were found in the shallow aquifer, but some leakage from the shallow aquifer was evident. The RI indicated the groundwater flow in both the shallow and deep aquifers was in an easterly direction toward the wetlands and that it was possible that one or both aquifers discharged to the wetlands area (**Attachment B, Figures 3 and 4**).

Risk evaluations of the possible effects caused by the levels of these chemicals showed significant cancer potential levels for children playing on the Site and for industrial workers who may work on the Site if it is redeveloped. EPA determined that the remediation of the soil and groundwater was necessary to protect human health and the environment.

A Feasibility Study (FS) was conducted to analyze the remedial alternatives. EPA evaluated each of the alternatives for soil and groundwater remediation based upon cost, technical feasibility, institutional requirements, and the degree of protection of human health and the environment.

On August 26, 1987, EPA held a public meeting at the County Administration Building located at South Lake Drive, Lexington, South Carolina. At this meeting, EPA discussed the remedial alternatives developed in the FS and reviewed the preferred alternative. After considering the public's comments on the preferred alternative, EPA signed and issued the ROD in September 1987. EPA began the remediation at the Site in 1988 using Superfund monies.

IV. Remedial Actions

A. Remedy Selection

The purpose of remedial action at the PWPS is to mitigate and minimize contamination in the soils and groundwater, and to reduce potential risks to human health and the environment. The following clean-up objectives were determined based on regulatory requirements and levels of contamination found at the Site:

- To protect the public health and the environment from exposure to contaminated on-site soils through inhalation, direct contact, and erosion of soils into surface waters and wetlands;
- To prevent off-site movement of contaminated groundwater.
- To restore contaminated groundwater to levels protective of human health and the environment.

A complete description of the selected remedy is contained in the ROD. In summary, the Palmetto Wood remedy addresses the contaminated soil and the contaminated groundwater present at the Site. EPA separated the soil and groundwater remediation into two OUs. The remedy includes:

Operable Unit One – Soil

1. Soil extraction and flushing with an acidic solution.

2. Placement of treated soil in the original excavation trench where natural aeration would be supplemented by tilling and compaction.

Operable Unit Two – Groundwater

1. Extraction of groundwater.
2. Treatment of groundwater by filtration and ion exchange on Site
3. Discharge of treated groundwater to the City of Cayce's Publicly Owned Treatment Works (POTW) via a nearby sewer line.

Explanation of Significant Differences

1. Changes in the Soil Remediation

In 1988, the agency conducted national studies that revealed that flushing soils with a solution containing acid water and sodium metabisulfite solution would reduce the chromium in the soils to a trivalent state. Based on these studies, EPA determined, during the RD stage, that flushing the soils with an acid water/sodium metabisulfite solution would be more effective and cost efficient remedy for the Site than washing the soils with acidic water solution for several reasons. First, the sodium metabisulfite solution would reduce the chromium to a trivalent state. In this trivalent state, the chromium-contaminated soils could then be solidified and stabilized with field-proven technology. The solidification and stabilization of the soils would further ensure against contaminant leachate moving from the soil into the groundwater. If chromium-contaminated soils remained in the hexavalent state, EPA anticipated that flushing with acidic water would not completely remove the chromium contamination to the cleanup goals and solidification and stabilization would be less effective on the residual hexavalent chromium.

Secondly, the cost of performing the remedy would be reduced by using the acid water/sodium metabisulfite solution. EPA would retain the neutralized material on-site, avoiding the off-site disposal expenses contemplated by the original decision. In addition, EPA would not need to design a specialized flushing system that use of the acidic water solution would require.

Finally, the use of the acidic water/sodium metabisulfite solution would expedite the cleanup. Significant design work would have been required to develop a specialized system to wash the soils with the acid water solution and achieve the cleanup criteria. EPA, by utilizing field-proven systems, could accomplish the same protectiveness through chromium reduction by use of the acid water/sodium metabisulfite solution followed by solidification and stabilization while minimizing the design time and expense.

2. Changes in groundwater remediation

Based on national pilot tests of three treatment plants (with flow rates of 25 gallons per minute) utilizing the ferrous ion method of heavy metal reduction and precipitation and a pilot study conducted at the Site, EPA determined that the ferrous ion system rather than the ion exchange system would be the best system for the reduction and precipitation of heavy metals in the groundwater at the Site. In 1991, EPA conducted a pilot study at the Site to determine (1) if the ferrous ion treatment technique was capable of removing the contaminants from the groundwater sufficiently to meet the City of Cayce's sewer discharge parameters, and (2) the characteristics of the waste sludge produced.

The results of the study indicated that discharge of the treated groundwater from the ferrous ion system would be in full compliance with provisions of the Sewer Use Ordinance of the City of Cayce, the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (Public Law 95-217), the General Pretreatment Regulations for existing and new sources of pollution (40 CFR Part 403), and other applicable regulations promulgated and adopted by SCDHEC and the City of Cayce. The results also indicated that the system allowed for the identification of the characteristics of the waste sludge.

In addition, this treatment system produces a non-hazardous sludge. Thus, operating costs for the aquifer remediation system should be substantially less over the life of the project for disposal of non-hazardous metal sludge as opposed to hazardous metal sludge.

B. Remedy Implementation

EPA began the remediation for the soil (OU-1) on September 30, 1988. EPA excavated, treated, solidified and replaced 12,688 cubic yards of soil, eliminating the potential for off-site contaminant migration. EPA completed this portion of the cleanup on February 8, 1989.

Remedial action design and implementation of the RA for the groundwater (OU-2) was executed by OHM Remediation Services Corporation (OHM) under subcontract from Camp Dresser and McKee Inc. (CDM). The plans included the installation of the extraction system, water treatment system and discharge system.

The extraction system is comprised of four recovery wells (RW-1, RW-2, RW-3, and RW-4), six extraction wells (EW-1, EW-2, EW-3, EW-4, EW-5, AND EW-6), eight monitor wells (GMW-13S, GMW-13D, GMW-14S, GMW-14D, GMW-15S, GMW-15D, GMW-16D, and GMW-17D), an influent line, and leak detection system (Attachment B, Figures 3 and 4).

The water treatment system (WTS) consisted primarily of the WTS building, associated treatment equipment, and influent and effluent tanks (Attachment C).

The disposal system consisted of the effluent line and the City of Cayce main tie-in.

The Construction Phase of the project was initiated with the mobilization on February 26, 1996 and concluded with the 7-day operational performance test on October 15, 1996 which signified substantial completion and start of O&M.

The Final Inspection and Acceptance of the project was conducted on May 20, 1997 in the presence of representatives from EPA and OHM.

C. System Operations

OHM, the constructor, implemented the PWPS RA under subcontract with CDM Federal. OHM changed to International Technologies hereinafter referred to IT/OHM in November 1998. OHM subcontracted with Culligan to provide the South Carolina Class B wastewater treatment plant operator from October 1996 through October 1998. From November 1998 through March 1999, IT/OHM subcontracted with EA services to provide the South Carolina Class B wastewater treatment plant operator.

The work is being conducted in accordance with the approved O&M Plan. System operations requirements for the PWPS include:

- Daily operation of all site extraction, treatment, and discharge systems to include taking confirmation samples, maintaining the facilities, and performing all necessary reporting, record keeping, and submittals;
- Weekly calibration of influent and effluent meters;
- Biannual sampling of the groundwater monitoring wells;
- Ongoing maintenance of the Groundwater Extraction and Treatment System (GETS).

The total gallons of water extracted, treated, and discharged during the interim O&M period October 15, 1996 through March 28 1999 was 130,098,350. The total cost of O&M during this period was \$974,986. Based on this 29.5 month period, the average monthly costs were \$33,050. These costs include the Direct Costs for CDMs lower tier subcontractor (OHM/IT), and CDMs Indirect Costs, Base & Award Fee Totals.

Several change orders were issued to provide for changed conditions and additional work. Issued change orders were later compiled into subcontract modifications. One modification (Modification 5) was issued during O&M involving changes to the subcontract value. Modification 5 in the amount of \$226,263.69 for a new total of \$2,564,833.12. Table 2 summarizes O&M costs for the site.

Table 2: Summary of O&M Costs

Dates		Total Cost rounded to nearest \$100
From	To	
10/96	12/96	\$51,200.00
01/97	12/97	\$61,000.00
01/98	12/98	\$285,900.00
01/99	12/01	\$568,900.00

D. Progress Since Commissioning

During the current five-year review period following commissioning several problems were encountered and corrective actions taken, and modifications/additions to the design of the WTS were made. Problems encountered included reduced flow rates and electrical problems due to electrical surges that required minor adjustments, replacement of pumps and other minor repairs. The significant changes in the design of the system include the elimination of the Tank Immersion Heater and the addition of an effluent level transmitter. The Tank Immersion Heater was not necessary because the observed coldest temperature in the area would not warrant its use, and the heater could present a safety hazard. The effluent tank has four level switches but they did not provide any tank level indicator at the Andco panel which was needed to provide a more automatic system.

Based on an evaluation of groundwater sampling data, pumping from EW-1 was discontinued in January 1997. A review of the analytical results from well EW-1 and surrounding monitoring wells for the last three rounds of sampling (April, September, and December 1996) indicated that the groundwater Contaminants of Concern (COC) concentrations in this area were well below clean-up goals.

The influent data collected since the beginning of the O&M phase continued to indicate that, in general, the concentrations of COCs were below the discharge criteria but above the remedial action goals (primarily for total chromium). On February 1998, CDM recommended to EPA to bypass all treatment with the exception of pH adjustment and to discharge directly to the City of Cayce's POTW. Essentially, groundwater would continue to be extracted but only pretreatment for pH below 7 was needed. Both the EPA and the City of Cayce concurred.

V. Five-Year Review Process

The PWP site Five-year Review was conducted by the USACE, Charleston District for USEPA, Region IV. The Remedial Project Manager (RPM) for the site is Al Cherry. The following team member(s) from the Corps assisted in the review:

- Dante V. Agulto, Electrical Engineer

The Five-year Review consisted of the following activities: a review of relevant documents (Attachment A); interviews with EPA Region IV Remedial Project Manager;

City of Cayce representative; SCDHEC Environmental Engineer Associate; CDM Project Manager; CDM Project Engineer; O&M contractors (EA Services); and a site inspection. The final report will be available in the information repository (R.H. Smith Library.)

VI. Five-Year Review Findings

A. Interviews

The following individuals were contacted by fax and phone as part of the five-year review:

EPA Region IV Remedial Project Manager, Mr. Al Cherry. Mr. Cherry was contacted in March 2002 during the initial planning phase for this Five-Year Review. Mr. Cherry provided background information on the PWP Site and a list of potential contacts having knowledge of site activities.

City of Cayce Representative, Mr. Frank Robinson. Mr. Robinson was interviewed over the telephone. Asked about his impression of the project, Mr. Robinson stated that the project is well-managed and very clean operation. He also stated that his office conducts annual sampling and inspection of the facility and that the results are in compliance with the city's permit; and receives monthly monitoring reports from the O&M contractor. The only incident that required a response by his office is the Class Action suit filed due to the bankruptcy of IT. He feels that he is well informed of the site activities and progress.

SCDHEC Environmental Engineer Associate, Ms. Keisha Long. Ms. Keisha Long has recently replaced Ms. Yan Qing Mo as the SCDHEC contact for the PWPS. Ms. Mo was not available for an interview regarding her impression of the progress made during this reporting period.

CDM Federal Project Manager, Mr. Tim Eggert. As to his impression of the project, Mr. Eggert stated, "Good project; implementing a performance-based design of a groundwater treatment system through construction, start-up, and O&M." He further stated, "Construction was on schedule and within budget. Through optimization of the water treatment system, the full treatment process (ferrous ion) was reduced to a bypass mode requiring only pH adjustment upward."

CDM Federal Project Engineer, Mr. Tim Turner. His general impression of the project is that it's a "Good project. Has significantly reduced the levels of chromium in groundwater plume. Construction was on schedule and within budget. Plant is in bypass mode. Chromium levels are low enough for city to take without treatment. Only pH is treated from 4.4 to 7.8."

O&M Subcontractor Project Manager, Mr. Keith Murphy. "This facility performs well in regards to day-to-day operations. The plant is easy to control and monitor due to

the automation of the system. This feature facilitates operational changes. There is an autodialer which notifies our operator when a problem does arise. He can then call the site and determine what zone has called in and respond in the appropriate manner. This feature allows the operator to make corrections to the plant in a more timely manner.”

B. Site Visit/Inspection

The Five-Year Review site inspection for the PWP Site was held on June 4, 2002. The site visit began with a meeting at the WTS plant and introductions of all personnel involved. Please note that this is the first meeting between the Corps of Engineers, Charleston District and CDM Federal and the O&M subcontractor, EA Services. The meeting also included an overview of the review process, regulatory issues, operational status and interviews with Mr. Tim Eggert, CDM Project Manager; Mr. Tim Turner, CDM Project Engineer; Mr. Keith Murphy, on-site O&M manager, EA Services. The list of USACE and PRP personnel who participated in the meeting is provided as **Attachment D** to this report.

Conditions during the inspection were favorable with overcast skies and mild temperatures.

The landfill cap appears to be in good condition. It is protected by chain link fencing and permanently locked. A sign in front indicating that it is a Superfund cleanup site appeared to be weathered.

The groundwater treatment system was found to be operating and functioning properly. All groundwater extraction well covers were intact and locked, with no signs of damage. The pumps were withdrawing water at their designed flow rates in gpm.

Access to the site is well controlled via a normally-locked gate. Appropriate signs are posted along the perimeter of the site. Overall, the security is good. The overall appearance of the site is also good.

After the walk-through to the site, the participants went back to the WTS plant office and the Corps representative inspected the following documents: O&M manuals, Health and Safety Plan (HASP), City of Cayce Permit, Material Safety Data Sheet for all chemicals, Groundwater Treatment System Daily Log, and EA Services Employee Guide to Health and Safety. The daily tasks and activities are based on O&M plan that included as-built drawings, maintenance logs, sampling and analysis plan, and Occupational Safety and Health Administration (OSHA) training records.

VII. Assessment

A. Data Review

A review of records and monitoring reports through April 2002 (**Attachment E, Tables 1 and 2**) indicates that since the initiation of groundwater extraction (October 1996), the

concentrations of total chromium in groundwater are generally decreasing. The chromium concentration trends in groundwater since the initial round of remedial action sampling (April 1996) for ten of the more contaminated wells are plotted in **Attachment E, Figures 1-3**. This general decreasing concentration trend is an indication that remedial action goals are being achieved with the current groundwater extraction system.

As indicated in the table below, eight out of the ten more contaminated wells showed a decrease in total chromium concentrations from the previous round of sampling. The total concentration in well RW04SH remained unchanged from the October 2001 reading. The total chromium concentration in well GMW14DP increased by about 38% from 94 ug/l (October 2001) to 130 ug/l (April 2002).

Rec/Ext Wells	October 2001 (ug/l)	April 2002 (ug/l)	Percent Change
RW01DP	240	200	-16.6%
RW02SH	270	200	-25.9%
RW03DP	470	430	-8.5%
RW04SH	180	180	0.0%
EW02DP	190	170	-10.5%
EW03DP	280	220	-21.4%
EW04DP	170	140	-17.6%
EW05DP	180	140	-22.2%
EW06DP	180	140	-11.1%
GMW14DP	94	130	+38.3%

It is therefore recommended that groundwater remediation including extraction and discharge of the contaminated groundwater at the PWPS continue until concentrations of total chromium are at or below the MCL of 100 ug/l.

B. Trend Analysis

A review of the HASP indicates that a plan is in place and this plan is sufficient to control risks at the site. Further, the plan is being properly implemented. In summary, the remedial action objective of preventing direct contact or ingestion of contaminated soils continues to be met by the intact cap. Monitoring results show decreasing concentrations of chromium, the remaining COC, but still above the remedial objective. The remedial action for the groundwater (OU-2) will continue until the chromium concentration is at or below 100 ug/l.

C. Applicable or Relevant and Appropriate Requirements (ARARs) Review

An ARAR review was performed for the site in accordance with the draft EPA guidance document, "Comprehensive Five-Year Review Guidance," EPA 540R-98-0850, October 1999.

Documents reviewed for the ARAR analysis:

1. Record of Decision, September 27, 1987
2. Explanation of Significant Differences, September 21, 1993
3. Preliminary Remedial Action Report by CDM Federal, June 3, 1997
4. Interim Operation and Maintenance Report by CDM Federal, June 8, 1999
5. Semi-annual Groundwater Monitoring Report, April 2000
6. Semi-annual Groundwater Monitoring Report, October 2000
7. Semi-annual Groundwater Monitoring Report, April 2001
8. Semi-annual Groundwater Monitoring Report, October, 2001
9. Semi-annual Groundwater Monitoring Report, April 2002

ARARs pertaining to protectiveness identified for the site in the 1987 ROD and evaluated as part of this five year review are:

- Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) and,
- South Carolina State MCLs.

Other ARARs were identified in the ROD but were not evaluated as they do not impact the determination of the protectiveness of the remedy. These include:

- Resource Conservation and Recovery Act (RCRA) – Per the ROD, these standards applied to the soil remediation action which is completed.
- Clean Water Act – These standards would have applied to any surface water discharges, but as the treated groundwater is being discharged to a POTW, only the pretreatment standards would apply.
- Department of Transportation (DOT) regulations – These standards regulate how any hazardous materials generated at the site must be shipped/transported.
- Occupational Safety and Health Administration (OSHA) standards – These standards apply to worker protection.
- National Pollution Discharge Elimination System (NPDES) – These standards would apply to the discharge of pollutants to Waters of the U.S. Currently, the treated groundwater is discharged to a POTW.
- Endangered Species Act – The ROD stated these standards would be met during remedial design.
- Ambient Air Quality Standards – No standards of the National regulations are applicable nor relevant and appropriate to the remedial action.

The following table lists both the original MCLs as listed in the 1987 ROD and the current Federal and State values. Since 1987 the following changes have been made to the MCLs:

- The MCL for arsenic has changed from 50 ppb to 10 ppb.
- The total chromium MCL has changed from 50 ppb to 100 ppb (both state and federal values).
- The cleanup criteria for copper was originally 1000 ppb based upon tests and odor considerations. Since the signing of the ROD, a new federal and state standard of 1300 ppb has been established.

PALMETTO WOOD PRESERVING SUPERFUND SITE ARARS¹					
Change?	Contaminant	SDWA MCL²		South Carolina State MCL²	
		1987	2002	1987	2002
Yes	Arsenic	50	10 ³	50	50
Yes	Chromium	50	100	---	100
Yes	Copper ⁴	1000	1300	---	1300

1 – As identified in the 1987 ROD and compared to 2002 values.

2 – All units are in micrograms/liter unless otherwise specified.

3 – The new arsenic MCL of 10 ppb became effective 23 January 2001.

4 – The value provided for copper is not an MCL but rather an action level.

While some changes have occurred in the MCLs for the site, the new values are still protective and the treatment system is capable of attaining the new standards.

VIII. Issues

Aside from the filing of bankruptcy by IT, the O&M subcontractor, in April 2002, no other issues or deficiencies were identified. The bankruptcy filing did not affect the remedial action activities at the site.

IX. Recommendations and Follow-up Actions

Groundwater monitoring, treatment and disposal should continue until chromium concentrations, the remaining COC, fall at or below the MCL of 100 g/l.

X. Protectiveness Statement

Based on this Five-Year Review and the above summary, the following conclusion is drawn:

All of the elements of the remedy selected by the Record of Decision for the Palmetto Wood Preserving Site have been put in place, are functioning properly, are operated and maintained adequately, and remain protective of human health and the environment.

XI. Next Review

The Palmetto Wood Preserving Site is a statutory site that requires on-going five-year reviews. EPA should conduct the next review within five years of completion of this second five-year review listed as the date of signature on the inside cover of this report.

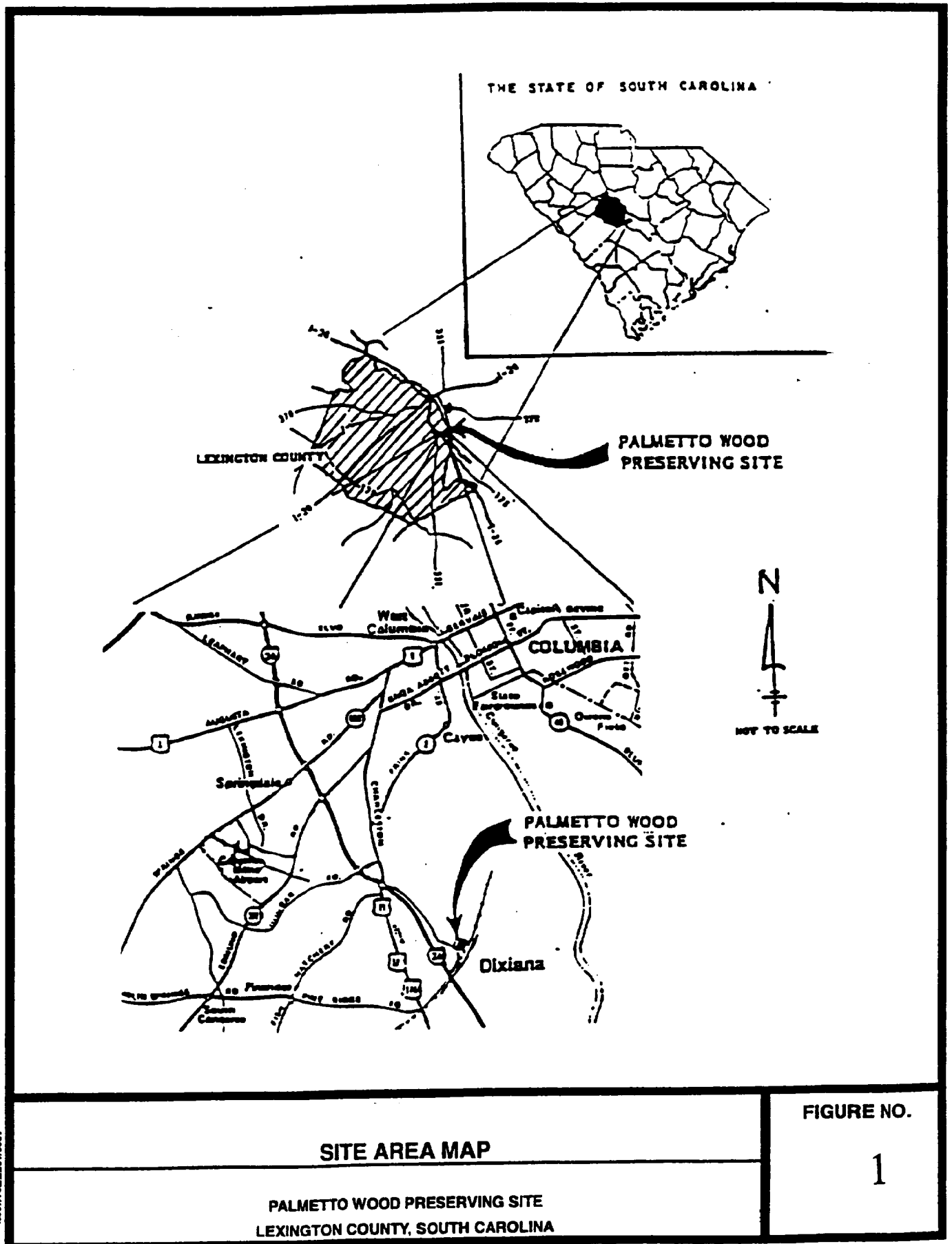
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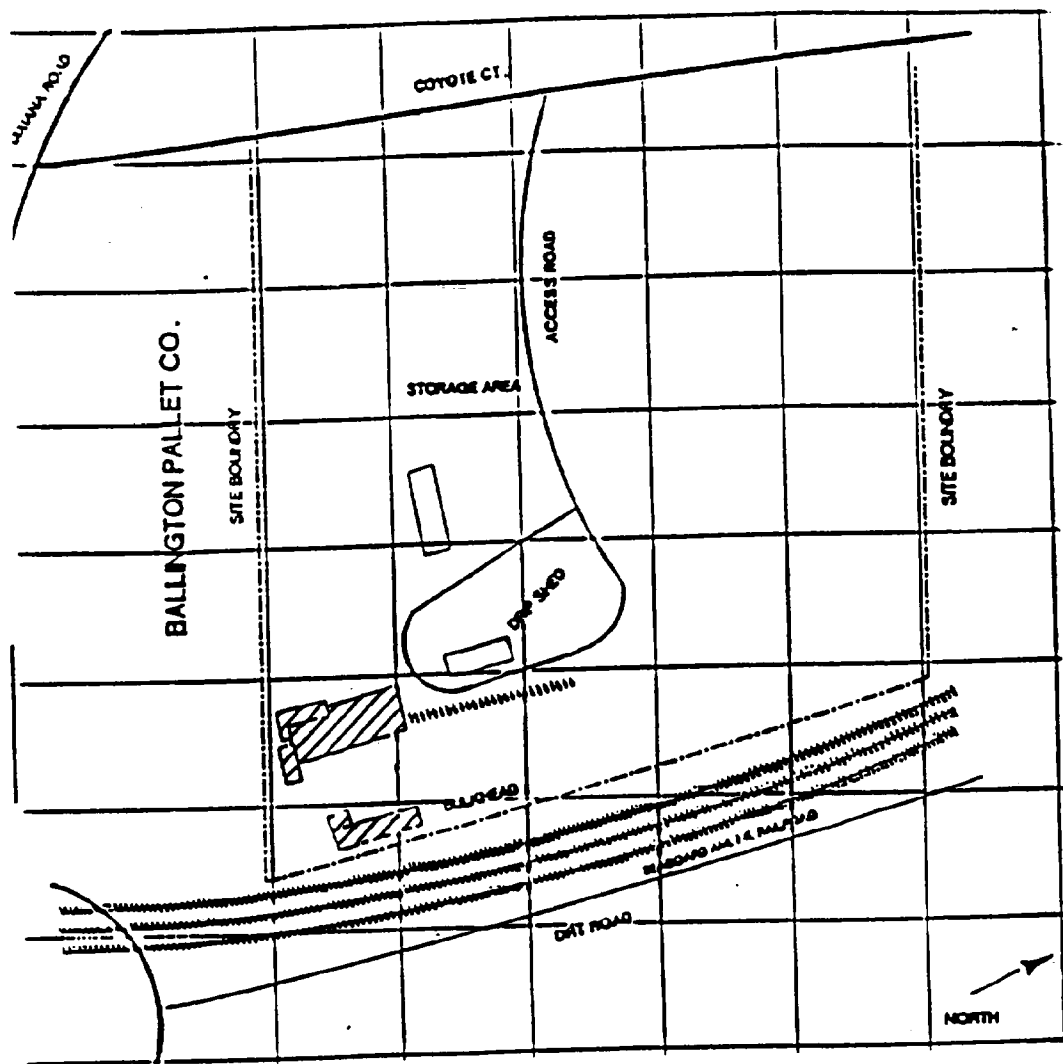
ATTACHMENT A

Documents Reviewed

1. Record of Decision. Palmetto Wood Preserving Site, Lexington County, South Carolina, (EPA, September 27, 1987)
2. Explanation of Significant Differences, (EPA, September 23, 1993)
3. Preliminary Remedial Action Report by CDM Federal, June 3, 1997
4. Interim Operation and Maintenance Report by CDM Federal, June 8, 1999
5. Operation and Maintenance Manual for Water Treatment Plant, January 1998
6. Operation and Maintenance Manual for Bypass Operation, April 2002
7. City of Cayce Permit
8. Safety Standard Operating Procedure based on OSHA Regulations
9. EA Services Employee Guide to Health and Safety
10. Material Safety Data Sheet for all chemicals
11. Groundwater Treatment System Daily Log

ATTACHMENT B
SITE MAPS



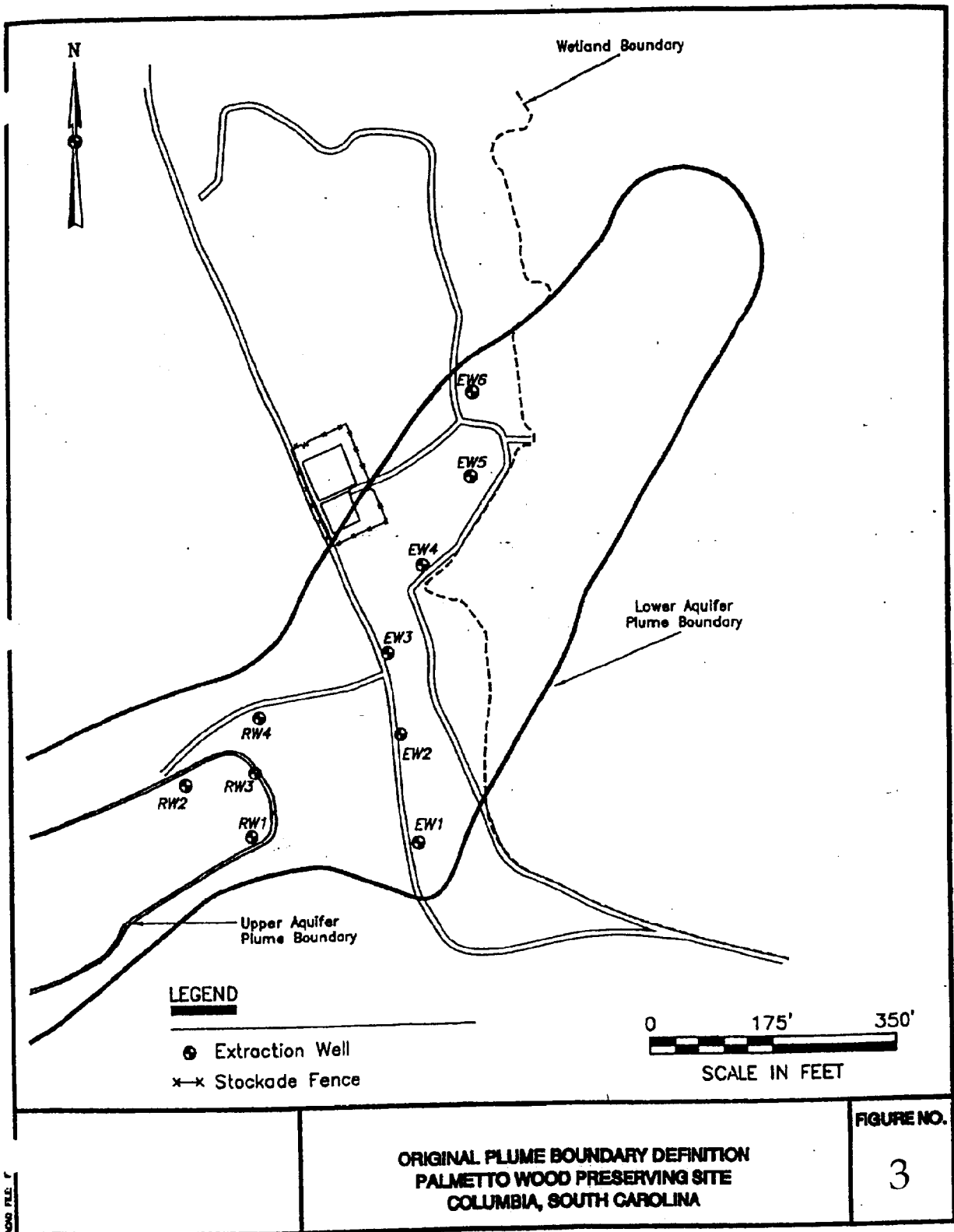


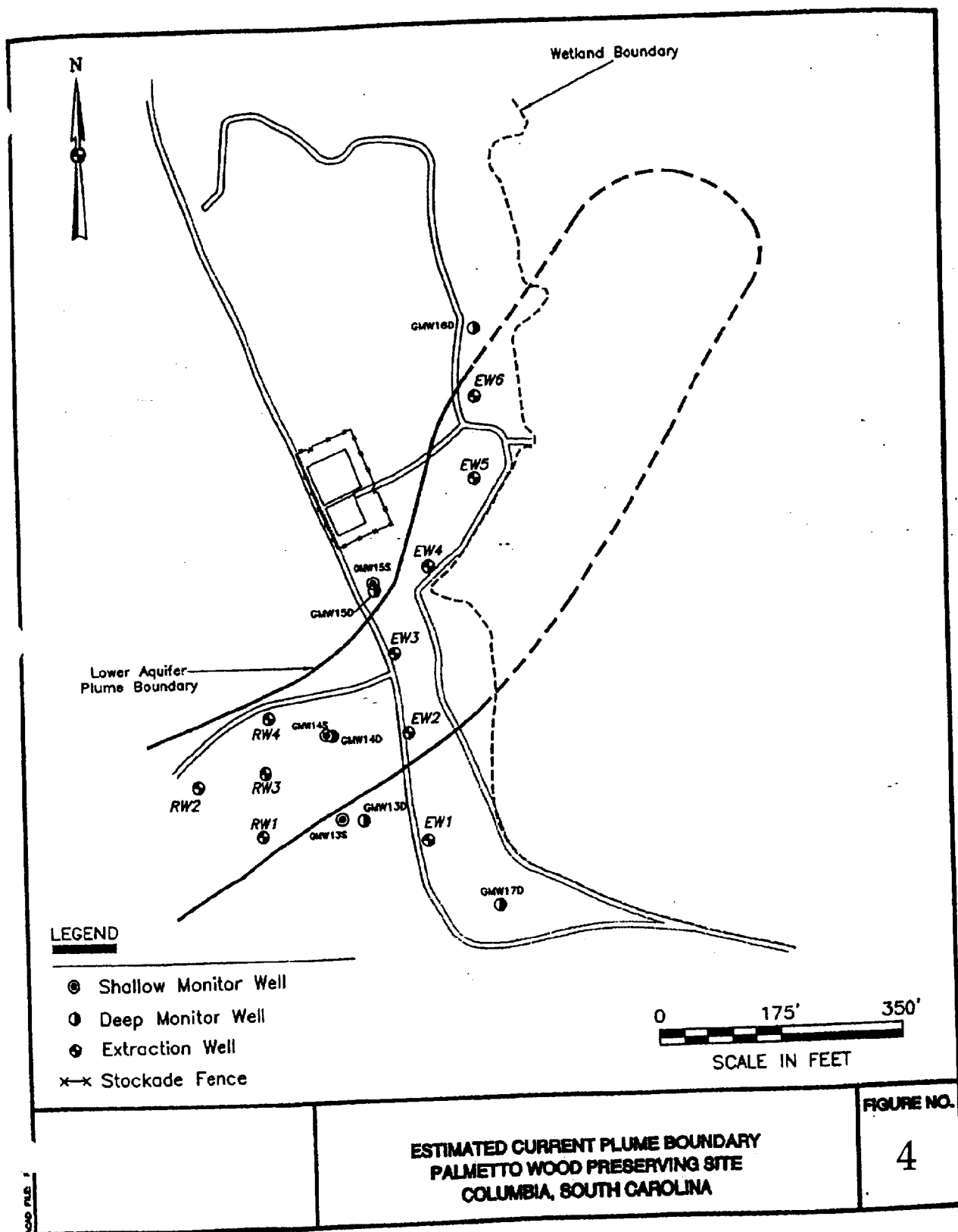
SITE FEATURES MAP

PALMETTO WOOD PRESERVING SITE
LEXINGTON COUNTY, SOUTH CAROLINA

FIGURE NO.

2





ATTACHMENT C
PHOTOGRAPHS



Figure 1 Influent/Effluent Tanks



Figure 2 Monitoring Wells

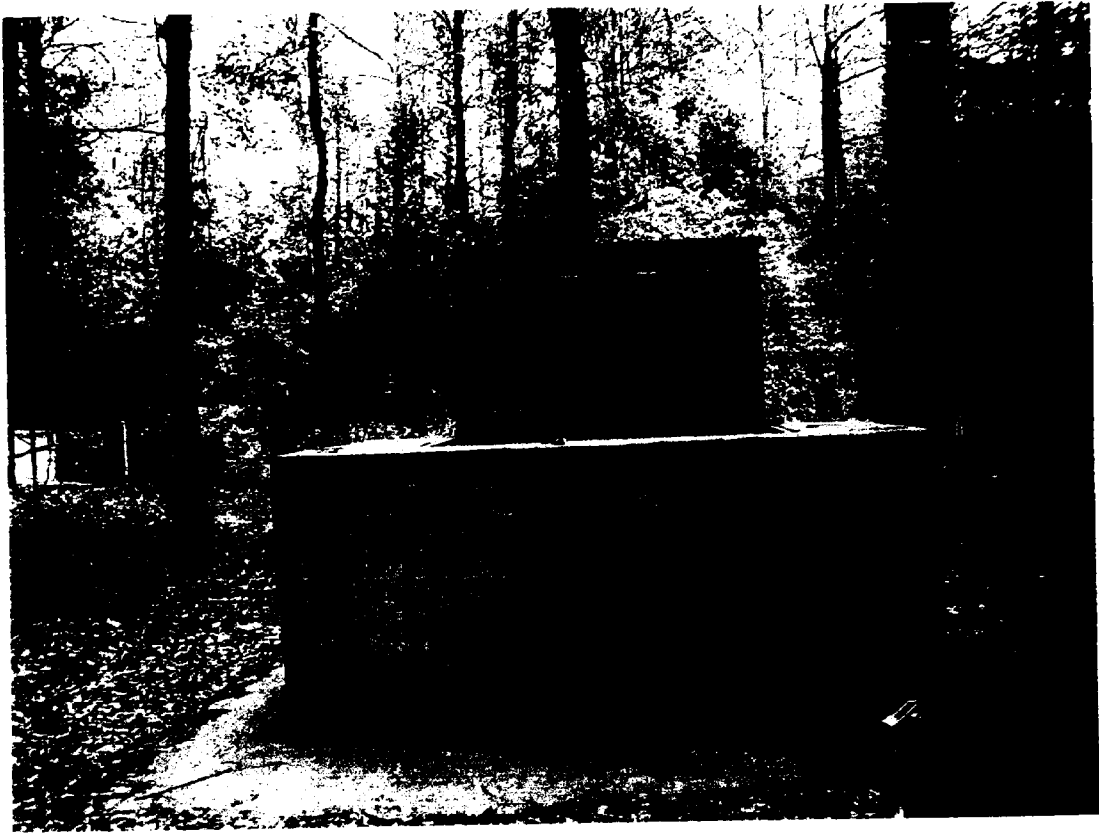


Figure 3 Recovery Well

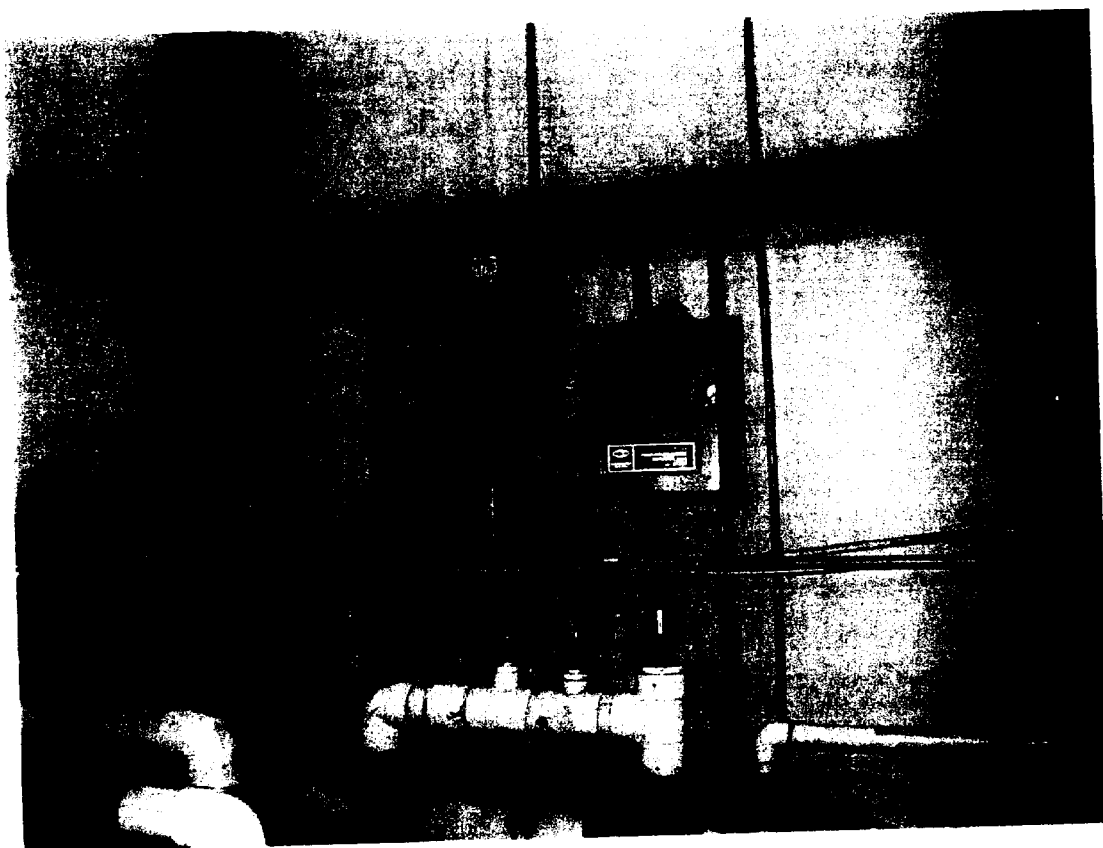


Figure 4 WTS Component

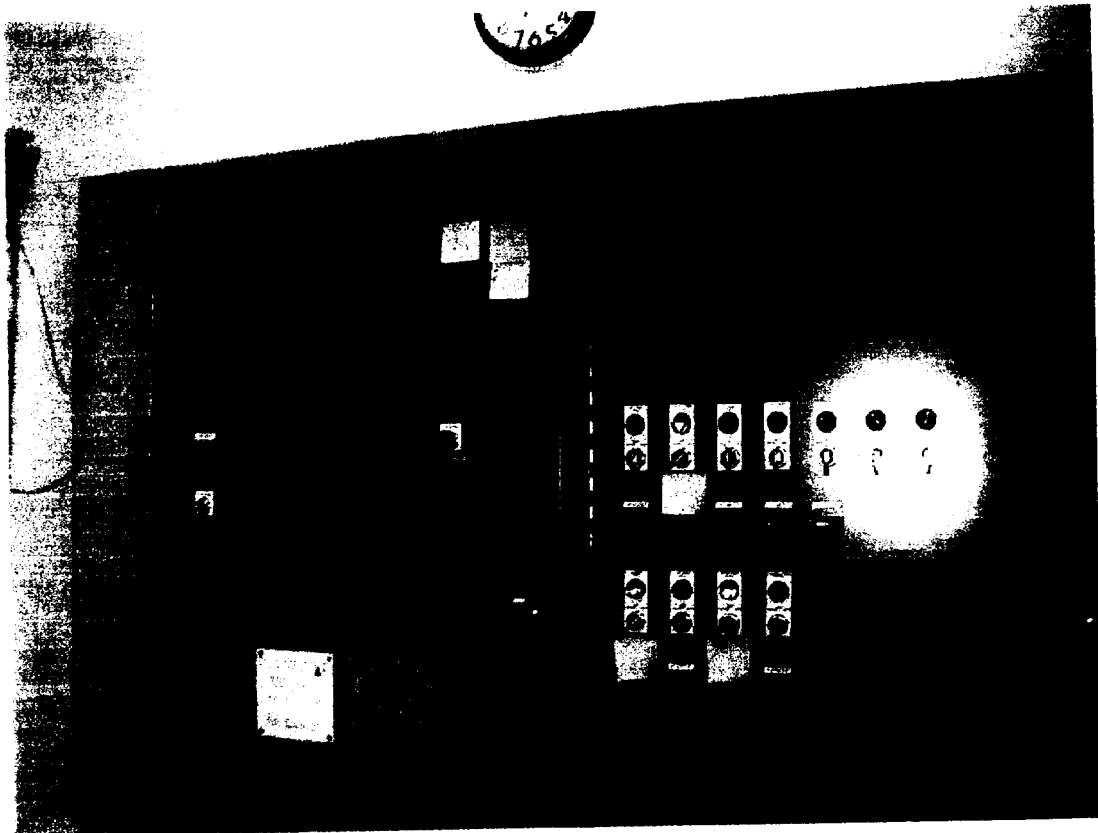


Figure 5 Andco Panel

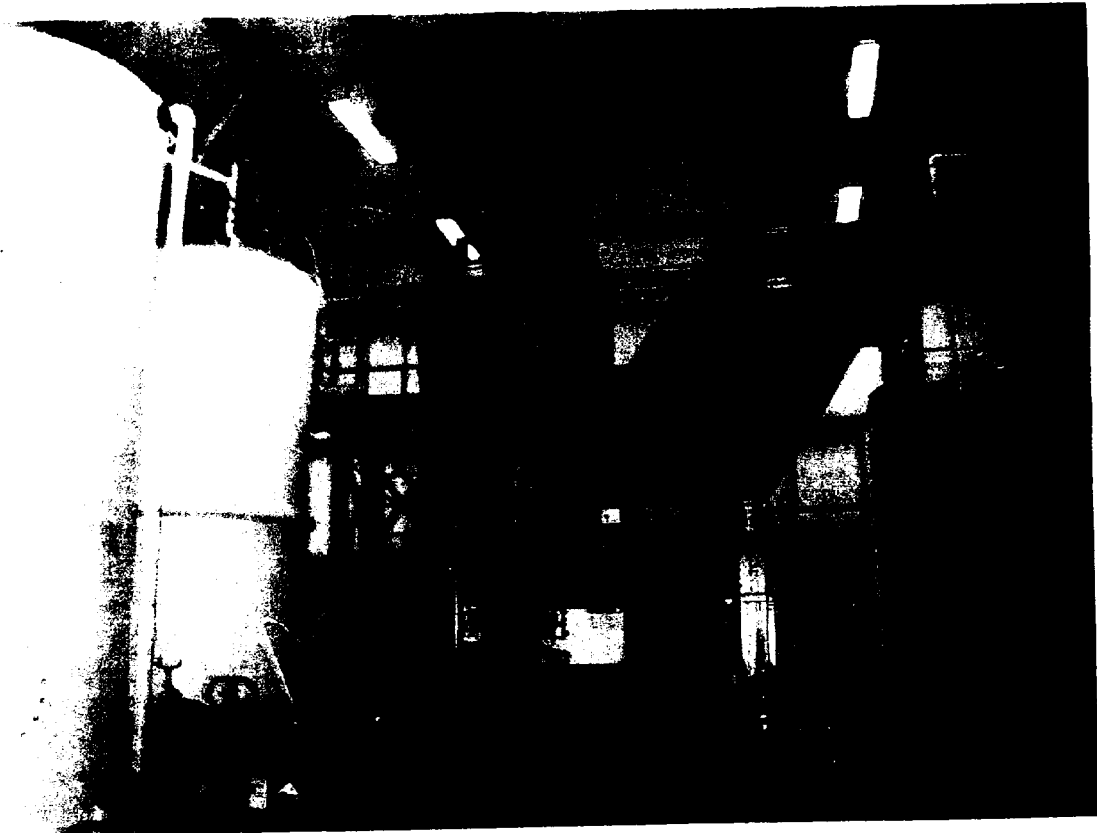


Figure 6 WTS Components

ATTACHMENT D

**List of Attendees
5-Year Review Site Visit
Date: 4 June 2002
Location: PWP Site
Dixiana SC**

ATTENDEES				
Name/Title	Organization	Address	Phone	Fax
Dante V. Agulto Electrical Engineer	USACE, Charleston	69-A Hagood Ave Charleston SC 29403	843-329-8042	843-329-2330
Tim Eggert Project Manager	CDM	2030 Powers Ferry Rd., Suite 325 Atlanta, GA 30339	770-952-7393	770-951-8910
Tim Turner Project Engineer	CDM	ditto	ditto	ditto
Keith Murphy Project Manager	EA Services	200 Rich Lex Dr. Lexington, SC 29072	803-796-9231	803-796-1602
John Garner Technician	ditto	ditto	ditto	ditto
Thurston Chavis President	ditto	ditto	ditto	ditto
Bill Watkins Technician	ditto	ditto	ditto	ditto

ATTACHMENT E
GRAPHIC: SAMPLING DATA RESULTS

TABLE 1

**GROUNDWATER SAMPLING SUMMARY - APRIL 2002
PALMETTO WOOD PRESERVING SITE
COLUMBIA, SOUTH CAROLINA**

Well Location	Chromium (Total) 100*	Copper 1300**	Arsenic 50*	Lead 15***
WTS Recovery/Extraction Wells:				
RW01DP	200	1.4U	3.0U	2.8U
RW06 DP (DUP OF RW01DP)	210	1.4U	3.0U	2.8U
RW02SH	200	1.4U	3.0U	2.8U
RW03DP	430	1.9U	3.0U	2.8U
RW04SH	180	2.2U	3.0U	2.8U
EW02DP	170	1.4U	3.0U	2.8U
EW03DP	220	1.4U	3.0U	2.8U
EW04DP	140	1.4U	3.0U	2.8U
EW05DP	140	1.4U	3.0U	2.8U
EW06DP	160	1.4U	3.0U	2.8U
WTS Monitor Wells:				
GMW13SH	.80U	1.4U	3.0U	2.8U
GMW43S (DUP OF GMW13SH)	.80U	1.4U	3.0U	2.8U
GMW13DP	.80U	1.4U	3.0U	2.8U
GMW14SH	.80U	1.4U	3.0U	2.8U
GMW14DP	130	1.4U	3.0U	2.8U
GMW15SH	.86R	1.4U	3.0U	2.8U
GMW15DP	50	1.4U	3.0U	2.8U
GMW16DP	5.6	1.4U	3.0U	2.8U
GMW17DP	.80U	1.4U	3.0U	2.8U
Preservative Blank:				
PB1	.80U	1.4U	3.0U	2.8U

WTS - Water Treatment System

* - Cleanup Goal based on Maximum Contaminant Level, 1993.

** - Cleanup Goal based on Maximum Contaminant Level Goal.

*** - Cleanup Goal based on Treatment Technique Action Level.

Data Qualifiers:

A = Average Value

J = Estimated Value

U = Material was analyzed for but not detected. The number is the minimum quantitation limit.

Concentrations presented in ug/L.

Italicized and bolded numbers represent concentrations exceeding cleanup goals.

TABLE 2
GROUNDWATER SAMPLING FIELD PARAMETERS - APRIL 2002
PALMETTO WOOD PRESERVING SITE
COLUMBIA, SOUTH CAROLINA

Well Location	Temperature (Degrees C)	pH	Conductivity (mS/cm)	Turbidity (NTUs)
WTS Recovery/Extraction Wells:				
RW01DP	17.9	5.0	0.027	0.00
RW02SH	17.7	5.1	0.042	11.70
RW03DP	18.0	5.1	0.040	1.68
RW04SH	17.6	4.8	0.045	0.23
EW02DP	18.0	4.9	0.017	0.00
EW03DP	17.9	4.9	0.022	0.00
EW04DP	17.9	4.9	0.022	0.00
EW05DP	17.6	4.8	0.021	0.00
EW06DP	17.3	4.5	0.058	0.00
WTS Monitor Wells:				
GMW13SH	19.1	4.9	0.022	0.00
GMW13DP	19.8	4.5	0.015	0.00
GMW14SH	19.8	5.1	0.016	6.00
GMW14DP	19.3	5.1	0.024	11.00
GMW15SH	18.5	4.4	0.025	8.80
GMW15DP	19.6	5.0	0.012	0.00
GMW16DP	17.5	5.3	0.013	0.25
GMW17DP	19.5	4.3	0.025	0.00

WTS - Water Treatment System
NTU - Nephelometric Turbidity Units
mS/cm - millisiemens per centimeter

FIGURE 1
CHROMIUM CONCENTRATION TRENDS IN GROUNDWATER - PART I
PALMETTO WOOD PRESERVING SITE
COLUMBIA, SOUTH CAROLINA

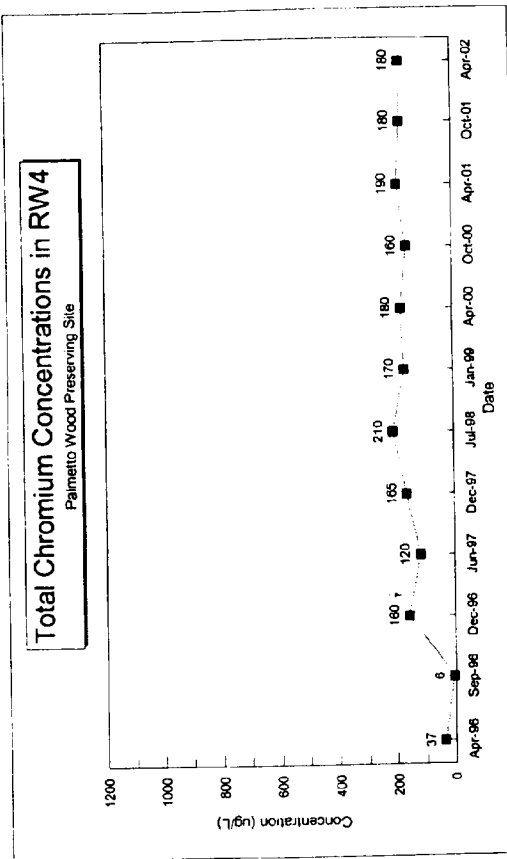
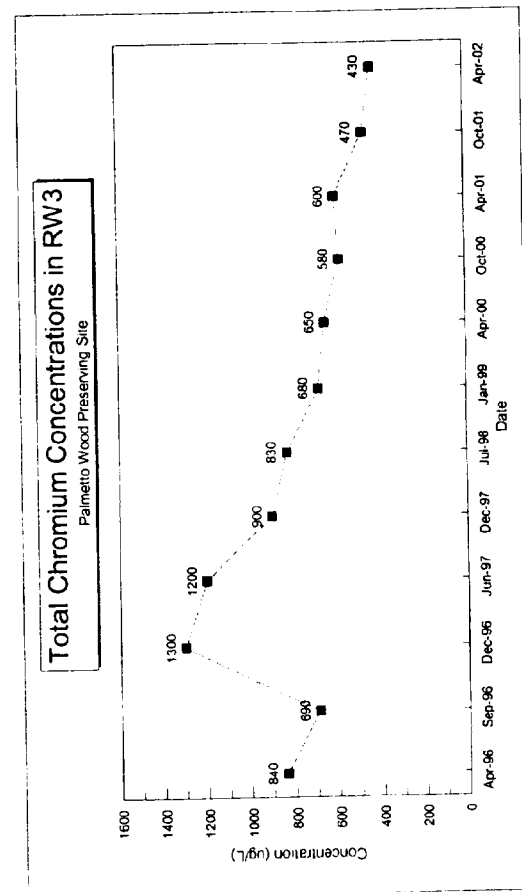
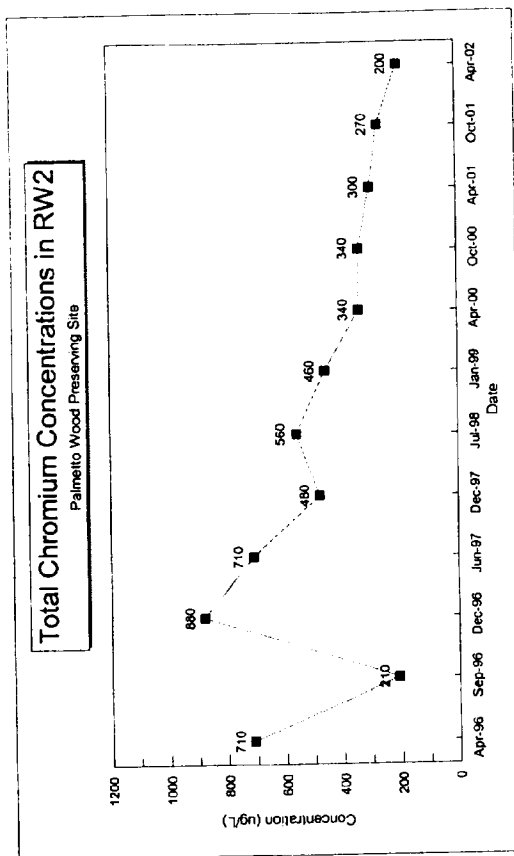
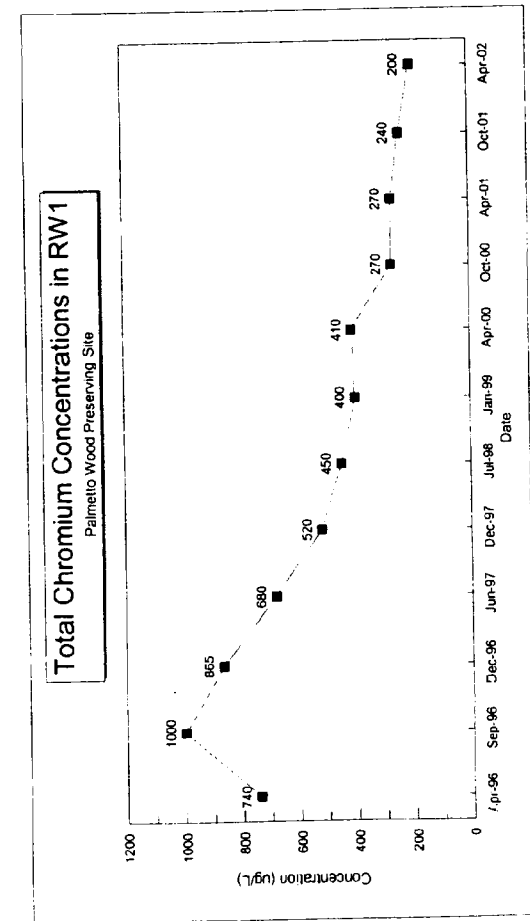


FIGURE 2

CHROMIUM CONCENTRATION TRENDS IN GROUNDWATER - PART II
PALMETTO WOOD PRESERVING SITE
COLUMBIA, SOUTH CAROLINA

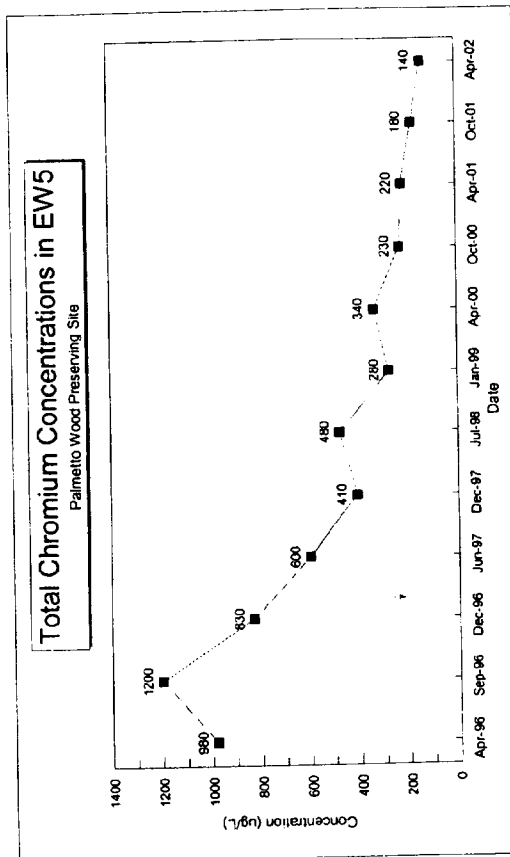
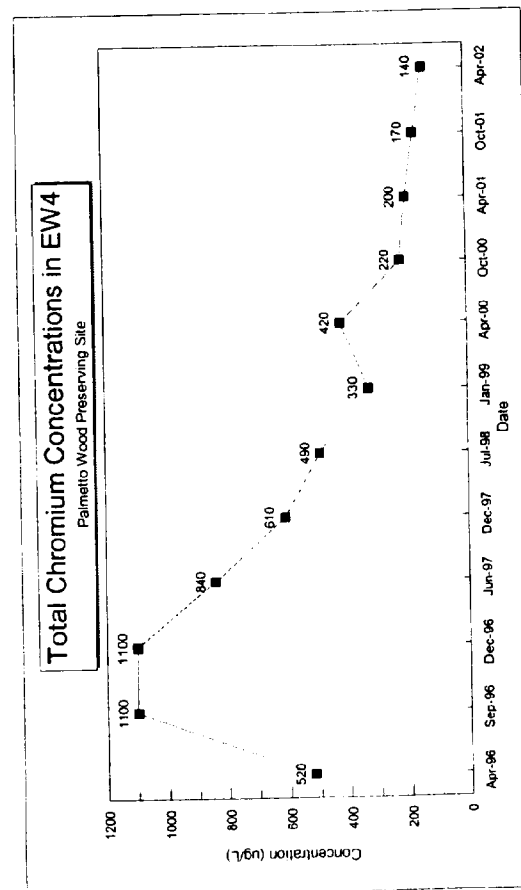
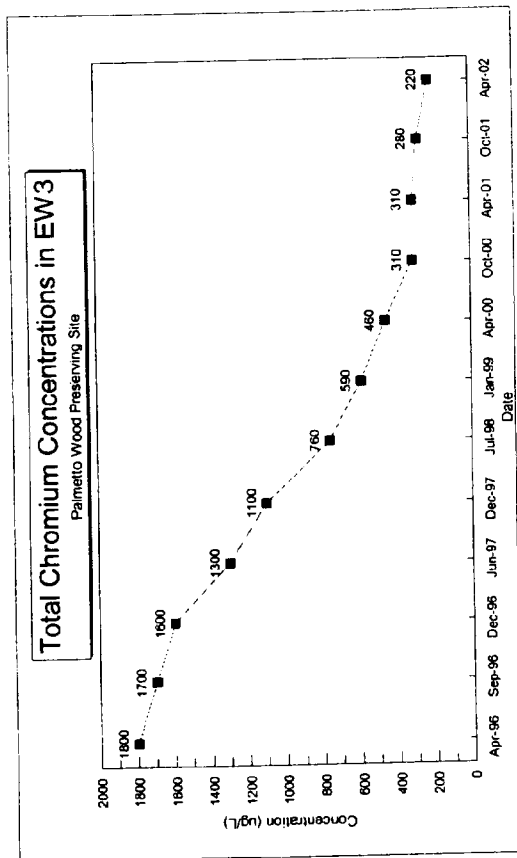
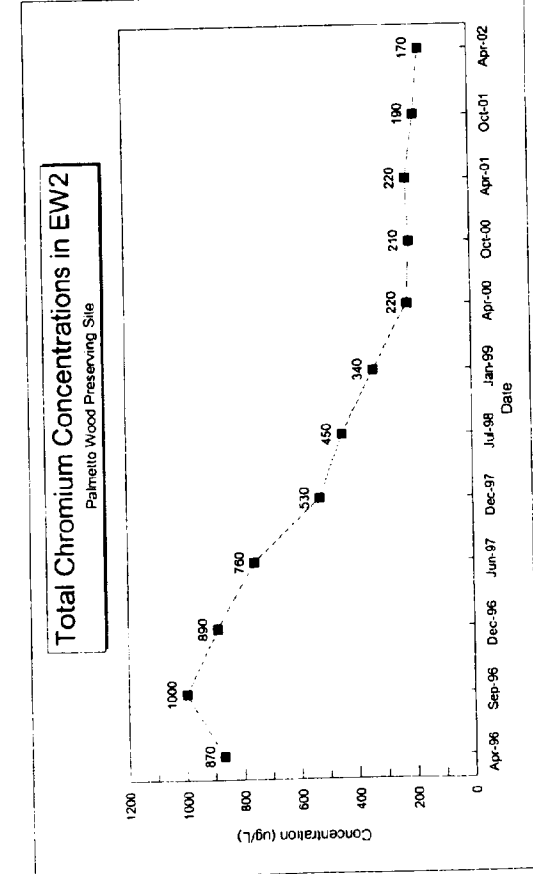


FIGURE 3

CHROMIUM CONCENTRATION TRENDS IN GROUNDWATER - PART III
PALMETTO WOOD PRESERVING SITE
COLUMBIA, SOUTH CAROLINA

